The Right Way to Insulate a Floor

by Bruce Sullivan

Builders searching house plans for someplace to put a bit more insulation often find help under the floor. It costs less to add insulation beneath the floor than to build thicker walls or to add foam sheathing. Even the typical attic seldom has room for more than 18 inches of insulation (R-50 to R-60) without the added expense of raised heel trusses.

Floor insulation is especially effective over an unconditioned basement or crawlspace. The myth that heat rises was used for many years to justify not insulating floors at all, which led to some very cold feet. The truth is that heat doesn't rise — hot air does. The process by which hot air rises is called convection, and it's just one of three ways that heat escapes a building. The other two are conduction and radiation, both of which work in all directions. Floor insulation limits all three modes of heat loss: A well-insulated floor's warmer surface temperature reduces the temperature difference that drives convection, while directly inhibiting conduction and radiation to the cold basement or crawlspace.

Doing It Right

Correct installation technique is as important with floor batts as it is with wall batts (see *Focus On Energy*, 2/93). For instance, batts must be cut carefully to fit into narrow joist bays, and to wrap around wires, pipes, and electrical boxes. (It's best to place pipes close to the floor decking, where you can cover them with insulation instead of fitting the insulation around them.)

The biggest problem with floors is missed spots. Cantilevers are big offenders, as are joists that get enclosed before the insulator shows up. Keep a few rolls of insulation on site during framing to use in these odd places.

The amount of floor insulation required by some codes can be less than the depth of the joists. (For example, an R-19 batt is only 6¼ inches thick and won't fill the bay between 2x8s or 2x10s.) To save money, it's tempting to put in the minimum. But floor cavities should be completely filled with insulation — without gaps or voids. Otherwise, air leaking around the insulation or circulating between the insulation and the subfloor will reduce the insulation's effective R-value. This makes it crucial that the insulation contact the subfloor and both joists.

Crushing or compressing batts will also reduce R-value. Unfortunately, the very act of pushing a narrow batt into a deep cavity invites compression. And the wire supports that most insulators use to hold batts in place compress them further, while also opening gaps along their sides.

A better option is to buy thicker batts. Material costs will climb slightly, but labor should be the same. Figure 1 shows several ways to use common materials which, when attached to the bottom of the floor joists, support the insulation without compression or gaps. One company makes a special plastic support that also works well (Figure 2).

Over the long term, floor insulation will pay for itself. The initial cost of upgrading floor insulation from R-19 to R-30 or R-38, for example, will be recovered easily in lower heating bills over the life of the house. Colder climates will benefit most, but even in moderate climates the economics are generally positive. ■

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Figure 2. *The ends of recycled-plastic Insul-Straps are wide enough for easy stapling. Insul Industries (2007 Yanceyville St., Suite 213, Greensboro, NC 27405; 800/372-7702) also makes a version with an adhesive strip on each tab for fastening to steel framing.*

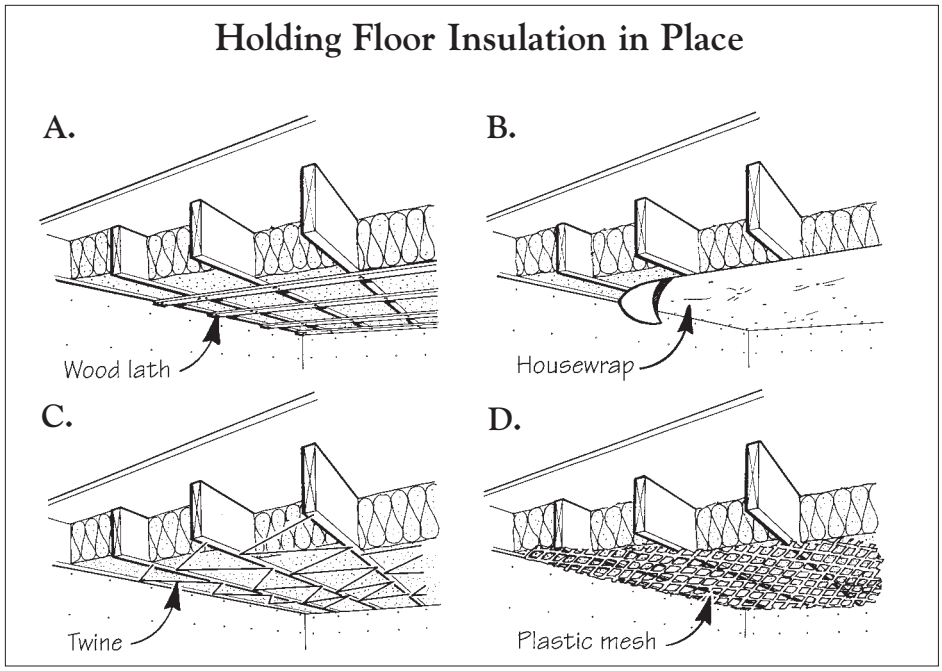

Figure 1. *Wood lath spaced every 12 inches (A) can provide a sturdy insulation support. Vapor-permeable housewraps (B) can also be safely used. Another option is twine (C), stapled every 12 to 18 inches. Avoid cotton twine and instead use polypropylene, which is inexpensive and resists rot, mildew, and rodents. Plastic mesh (D) also works well as long as it is attached to the bottom of the framing. Don't ever drape the mesh over the tops of the joists, as is the practice in some parts of the country; this compresses the batts and creates voids.*